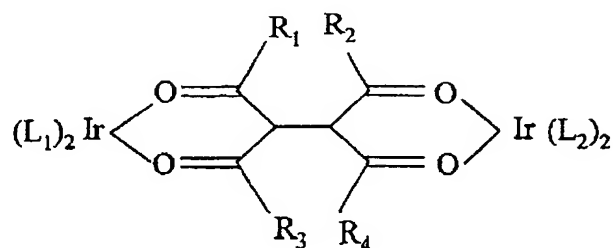


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Claims

1. An electroluminescent diiridium compound of formula



(A)

where R₁, R₂, R₃ and R₄ can be the same or different and are selected from hydrogen, and substituted and unsubstituted hydrocarbyl groups.

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2. A compound as claimed in claim 1 where R₁, R₂, R₃ and R₄ are selected from substituted and unsubstituted aliphatic groups, substituted and unsubstituted aromatic, heterocyclic and polycyclic ring structures, fluorocarbons such as trifluoromethyl groups, halogens such as fluorine or thiophenyl groups; R₁, R₂ and R₃ can also form substituted and unsubstituted fused aromatic, heterocyclic and polycyclic ring structures and can be copolymerisable with a monomer and L₁ and L₂ are the same or different organic ligands.

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3. A diiridium compound as claimed in claim 1 or 2 in which L₁ and L₂ are selected from phenyl pyridine and substituted phenylpyridines.

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4. An electroluminescent device which comprises (i) a first electrode, (ii) a layer of the diiridium complex as claimed in any one of claims 1 to 3 and (iii) a second electrode.

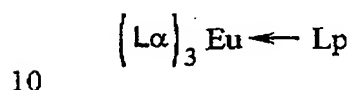
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5. An electroluminescent device as claimed in claim 4 in which the diiridium compound is mixed with an electroluminescent europium complex.

6. An electroluminescent device as claimed in claim 5 in which the europium organo
5 metallic or organic complex has the formula $(L\alpha)_3Eu$ where $L\alpha$ is an organic complex.

7. An electroluminescent device as claimed in claim 6 in which the europium organo metallic or organic complex has the formula



where $L\alpha$ and Lp are organic ligands and Lp is a neutral ligand, the ligands $L\alpha$ can be the same or different and there can be a plurality of ligands Lp which can be the same or different.

15 8. An electroluminescent device as claimed in claim 5 in which the europium organo metallic or organic complex has the formula $(L\alpha)_nEuM_2$ where M_2 is a non rare earth metal, $L\alpha$ is as above and n is the combined valence state of Eu and M_2 .

20 9. An electroluminescent device as claimed in claim 5 in which the europium organo metallic or organic complex has the formula formula $(L\alpha)_nEuM_2(Lp)$, where Lp is as above.

10. An electroluminescent device as claimed in claim 8 or 9 in which the metal M_2 can be any metal which is not a rare earth, transition metal, lanthanide or an actinide.

25 11. An electroluminescent device as claimed in claim 10 in which the metal M_2 is selected from lithium, sodium, potassium, rubidium, caesium, beryllium, magnesium, calcium, strontium, barium, copper (I), copper (II), silver, gold, zinc, cadmium, boron, aluminium, gallium, indium, germanium, tin (II), tin (IV), antimony (II),

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antimony (IV), lead (II), lead (IV) and metals of the first, second and third groups of transition metals in different valence states, e.g. manganese, iron, ruthenium, osmium, cobalt, nickel, palladium(II), palladium(IV), platinum(II), platinum(IV), cadmium, chromium, titanium, vanadium, zirconium, tantalum, molybdenum, rhodium, iridium, titanium, niobium, scandium, yttrium.

12. An electroluminescent device as claimed in any one of claims 6 -11 in which $L\alpha$ is of formula (I) to (XVII) herein.
- 10 13. An electroluminescent device as claimed in any one of claims 6 to 11 in which Lp is of formula (XVIII) to (XXV) herein or figs. 1 to 9 of the drawings.
14. An electroluminescent device as claimed in any one of claims 6 to 13 in which $L\alpha$ is selected from tripyridyl and TMHD, and TMHD complexes, $\alpha, \alpha', \alpha''$ tripyridyl and Lp is selected from crown ethers, cyclans, cryptans phthalocyanans, porphyrins ethylene diamine tetramine (EDTA), DCTA, DTPA and TTHA.
- 15 15. An electroluminescent device as claimed in any one of claims 4 to 14 in which the europium complex is $Eu(DBM)_3OPNP$.
- 20 16. An electroluminescent device as claimed any one of claims 4 to 15 in which there is a layer of a hole transmitting material between the first electrode and the electroluminescent layer.
- 25 17. An electroluminescent device as claimed in claim 16 in which the hole transmitting material is an aromatic amine complex.
18. An electroluminescent device as claimed in claim 16 in which the hole transmitting material is polyaromatic amine complex.

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19. An electroluminescent device as claimed in claim 16 in which the hole transmitting material is a film of a polymer selected from poly(vinylcarbazole), N,N'-diphenyl-N,N'-bis (3-methylphenyl) -1,1' -biphenyl -4,4'-diamine (TPD), polyaniline, substituted polyanilines, polythiophenes, substituted polythiophenes, polysilanes and substituted polysilanes.

20. An electroluminescent device as claimed in claim 16 in which the hole transmitting material is a film of a compound of formula (XXVI) or (XXVII) herein or as in figures 4 to 8 of the drawings.

21. An electroluminescent device as claimed in claim 16 in which the hole transmitting material is a copolymer of aniline, a copolymer of aniline with o-anisidine, m-sulphanilic acid or o-aminophenol, or o-toluidine with o-aminophenol, o-ethylaniline, o-phenylene diamine or with an amino anthracene.

22. An electroluminescent device as claimed in claim 16 in which the hole transmitting material is a conjugated polymer.

23. An electroluminescent device as claimed in claim 22 in which the conjugated polymer is selected from poly (p-phenylenevinylene)-PPV and copolymers including PPV, poly(2,5 dialkoxyphenylene vinylene), poly (2-methoxy-5-(2-methoxypentyloxy-1,4-phenylene vinylene), poly(2-methoxypentyloxy)-1,4-phenylenevinylene), poly(2-methoxy-5-(2-dodecyloxy-1,4-phenylenevinylene) and other poly(2,5 dialkoxyphenylenevinylenes) with at least one of the alkoxy groups being a long chain solubilising alkoxy group, poly fluorenes and oligofluorenes, polyphenylenes and oligophenylenes, polyanthracenes and oligo anthracenes, polythiophenes and oligothiophenes.

24. An electroluminescent device as claimed in any one of claims 16 to 23 in which the electroluminescent compound is mixed with the hole transmitting material.

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25. An electroluminescent device as claimed in any one of claims 4 to 24 in which there is a layer of an electron transmitting material between the cathode and the electroluminescent compound layer.

5 26. An electroluminescent device as claimed in claim 25 in which the electron transmitting material is a metal quinolate.

27. An electroluminescent device as claimed in claim 26 in which the metal quinolate is an aluminium quinolate or lithium quinolate.

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28. An electroluminescent device as claimed in claim 25 in which the electron transmitting material is of formula $Mx(DBM)_n$ where Mx is a metal and DBM is dibenzoyl methane and n is the valency of Mx .

15 29. An electroluminescent device as claimed in claim 25 in which the electron transmitting material is a cyano anthracene such as 9,10 dicyano anthracene, a polystyrene sulphonate or a compound of formulae shown in figures 2 or 3 of the drawings.

20 30. An electroluminescent device as claimed in any one of claims 25 to 29 in which the electron transmitting material is mixed with the electroluminescent compound.

31. An electroluminescent device as claimed in any one of claims 3 to 29 in which the first electrode is a transparent electricity conducting glass electrode.

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32. An electroluminescent device as claimed in any one of the claims 3 to 30 in which the second electrode is selected from aluminium, calcium, lithium, magnesium and alloys thereof and silver/magnesium alloys.

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